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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,686	02/22/2005	Stefan Kirchhoff	DN 02 - 011	9517

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Bethlehem, PA 18017

EXAMINER

BROWN II, DAVID N

ART UNIT	PAPER NUMBER
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1791

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/525,686	Applicant(s) KIRCHHOFF ET AL.	
	Examiner DAVID N. BROWN II	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>24 apr 2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6, 10, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 4,107,244 (Ochiai).

In regard to applicant claim 1, Ochiai discloses a “Method and apparatus for repairing damaged surface of refractory lined vessel,” (title). In order to identify areas in need of repair, Ochiai teaches using a microwave transmitter or a laser emitter (col. 4 lines 19-24; col. 5 lines 1-43), where according to column 4 line 24: “The emitted microwaves are reflected on the surface of the wear lining 3, are returned to the antenna 10, and enter the profile measuring machine after passing through the inverse route, and are separated by the circulator (not shown) and enter the reception unit.” Ochiai continues in column 4 line 30: “The distance r from the reference position to the surface of the wear lining 3 is obtained by detecting the phase difference between the transmission wave and reception wave, and is stored in the memory operation circuit 13 together with the signal of the position. The signals and the set profile (measured distance r_o of new wear lining 3) are compared and the difference (damage amount) is displayed.” Based to this information, Ochiai provides a “profile measuring machine”

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and stores information together "with the signal of the position." One skilled in the art would have recognized and appreciated that this process would have to be repeated in order to repair a damaged section of a lined vessel. Thus each stored profile measurement taken with respect to a position becomes an "area of the lining having a thickness below a pre-determined threshold value," as according to applicant claim 1. As the measuring process continues, more positions are acquired. Each position is an individual "isolated area". The sum total of these positions is the "combined isolated area," as according to the applicant claim. In applicant claim, values of 1 or 0 are assigned with respect to the necessity of repair where the value of 1 indicates need of repair. The data in the form of 1 xor 0 is known in the art as binary data. Also known in the art is the fact that any data in the form of "yes xor no," "on xor off," "proceed xor terminate" etc. is known as being in binary form. The Ochiai patent uses the same logic: If r = the reference distance value and r_o = the measured distance value, then all areas $r_o > (r-x)$ where x is an arbitrary value, and $(r-x)$ is the threshold value for repair will be repaired. All areas that return $r_o \leq (r-x)$ will be above the threshold level and will not be subject to repair. Also of note are times when $x = 0$. These are times when the reference value itself is the threshold value. Because the apparatus has only two options at this point, the logic becomes: *commence repair iff $r_o > (r-x)$* . The resulting command is "repair xor don't repair." This is binary logic.

Regarding claims 2-4, the limitation in claim 2 is addressed in the title "... Refractory Lined Vessel" of the Ochiai patent. As for claims 3 and 4, Ochiai states in the background section (line 14,): " The refractory lined vessels referred to in this invention

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are ladles, torpedo cars, mixers, converters, electric furnaces, spare or additional refining furnaces, and the like which are used in the steel making.” The method of Ochiai is used on metallurgical vessels as claimed by the applicant. This method employs a non-contact measuring device such as a laser (addressing claim 6) or microwaves (column 4 line 67). The controller, which is labeled element 19 in figure 6 of (Ochiai) electronically connects the measuring and repairing devices. This connection addresses applicant claim 10. Being that these devices are electronic, applicant claim 11 is hereby addressed.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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5. Claims 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochiai as applied to claim 4 (for claim 5) or claim 6 (for claim 7).

With respect to claim 5, while Ochiai is silent on the particular ladle to be repaired, the repair of any ladle according to the Ochiai invention would be the same regardless to the particular use of the ladle. All of the ladles recited in applicant claim 5 have identical structures and would therefore be repaired in the same fashion. For these reasons, it would have been obvious in the art to use the repair operation suggested by Ochiai for repairing the particular ladles recited in this claim since the repair operation suggested by Ochiai would be equivalently applicable.

With respect to claim 7, Ochiai discloses using a laser-based measuring device. One skilled in the art would have known a mirror scanner to be in operation at the time of the invention. An artisan would have reasonably recognized and appreciated that that a mirror scanner is functionally equivalent to the scanning laser suggested by Ochiai. That is, the mirror scanner would be effective in detecting defect in a liner by scanning through an inner wall of a lined vessel and obtain a profile measurement distance of the inner wall. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use a mirror scanning laser instead of a laser device as such is an art recognized effective means for detecting defect of a lined inner wall of a vessel.

6. Claims 8 and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Ochiai as applied to claim 1 and in view of US Patent 4,690,328 (Roehl).

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Ochiai addresses the movement of [Ochiai's] device in claims 4 and 5: "4. In the method as defined in claim 1 in which the antenna and gunning nozzle are made to rotate with the axis line of the vessel or the line in parallel with the axis line as the center, and are shifted for a fixed distance along the axis line of the vessel or a line in parallel with the axis line. 5. In the method as defined in claim 1 in which the antenna and the gunning nozzle are continuously shifted along the axis line of the vessel or a spiral with the line in parallel with the axis line as the center axis ". Not disclosed by Ochiai however is whether or not the device is tiltable. Roehl discloses a portable device for the repair of refractory linings that, according to the abstract, has an arm universally pivoted on a frame (abstract; col. 1 lines 28-32; col. 4 lines 50-65; figure 4). This arm is further described in the abstract as having a spray nozzle on the outer end. The device mentioned by Ochiai is intended to reach all areas of the refractory lining needing repair and is movable to accomplish such a purpose. Roehl uses a tilting mechanism in order to accomplish the same purpose. This is why one skilled in the art would recognize a tilting means as another means to move the device in order to accomplish the aforementioned task. It would have been obvious to one skilled in the art at the time of the invention to provide a tilting mechanism on a device of Ochiai in order to enhance the versatility of the device of Ochiai and to enable it to repair effectively lined vessel in a hard to reach area.

7. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochiai as applied to claim 1 and in view of US Patent Application Publication 2002/0158368 Wirth.

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Although Ochiai's method combines isolated areas and records positions, the coordinates are not mapped to a rectangular or cylindrical coordinate system (applicant calims 12 and 13). Ochiai does not mention the creation or use (for calibration) of a simulation (applicant claims 14 and 15). Wirth does, however, teach these concepts. Wirth addresses applicant claims 12 and 13. In paragraph [0038] Wirth recites: "...laser reader 706 is used to acquire the point cloud... the point cloud represents the dimensions of the interior of the vessel as recognized by a person of ordinary skill in the art." Later (Wirth) discloses [paragraph 0046]: "The data extracted from the point cloud is compared with the reference vessel characteristics to establish the deficiencies in the vessel lining. With these deficiencies defined, corresponding matrix data is generated and stored in predefined matrices." The point cloud may be defined in three-space coordinates $f(x, y, z)$ or in terms of a cylinder by $f(\rho, \phi, z)$ with mathematical manipulation. It would be obvious to one having ordinary skill in the art at the time of the invention to use mathematical manipulation such as defining the defects in three-space coordinates $f(x, y, z)$ or in terms of a cylinder by $f(\rho, \phi, z)$ in order to map the defined defective areas to a computer in order to develop a repair program. Wirth also uses computer programs and geometry [paragraph 0045] in order to create simulations in 3-space. These simulations are used in calibration and repair paragraph 0046, 0101]. Claims 14 and 15 are also addressed by Wirth. Wirth discloses in the abstract: "The disclosed systems and methods further include means for comparing the 3D geometric data corresponding to the interior of the vessel with 3D geometric data provided as a reference, generating a 3D repair trace based on the comparison, and

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controlling a spray gun for applying refractory material according to the trace by taking into account a set of physical variables related to the vessel and the refractory material.” The 3-D reference taught here is analogous to the simulation described in the applicant claims 14 and 15. This information is discussed again in paragraph [0028]. The device computes the difference between the reference and the actual vessel in order to judge repair performance. One would appreciate the combined teachings of Ochiai and Wirth to repair vessels. It would also be obvious to one having ordinary skill in the art at the time of the invention to create a simulation program in order to calibrate the repair program or to measure the extent of the repair performed.

Response to Arguments

1. Applicant's arguments filed 04/24/2009 have been fully considered but they are not persuasive.
2. Applicant's argument that the Ochai reference does not teach the combining isolated areas of the lining having a thickness below the pre-determined threshold value being combined into adjacent combined areas of the lining to which the binary value for areas of the lining have a thickness below the predetermined threshold value. Ochai teaches “When the total surface of the periphery of the furnace is measured by rotating the measuring rod 8 according to the foregoing system, the refractory damage thickness of the whole periphery of the horizontal cross section of the furnace can be obtained. Moreover, when the measuring rod 8 is moved vertically along the center axis of the furnace, the profile of the whole periphery of the furnace and the damage thickness can be obtained. (column 4 lines 38-46). Thus the combined areas are indeed adjacent.

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3. Applicant's argument that claims 5, 7, 8, 9, and 12-15 are allowable because the Ochai reference does not teach the combining isolated areas of the lining having a thickness below the pre-determined threshold value being combined into adjacent combined areas of the lining to which the binary value for areas of the lining have a thickness below the predetermined threshold value has been considered but is not persuasive. The combined areas are adjacent as they are part of "the whole periphery of the horizontal cross section of the furnace" as discussed above.

4. Applicant's argument that the combination lacks the step of combining isolated areas into adjacent combined areas has been considered but it is not persuasive. The combined areas are adjacent therefore, the rejection is maintained. Thus the examiner retains the rejection on claims 5 and 7, 8 and 9, and 12-15.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID N. BROWN II whose telephone number is (571)270-5497. The examiner can normally be reached on Monday-Thursday 7:30a-5:00p EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on (571)-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DAVID N. BROWN II/
Examiner, Art Unit 1791

/Joseph S. Del Sole/
Supervisory Patent Examiner, Art Unit 1791